
Appendix F

Distillation Unit Cost Analysis Worksheet

Economic Analysis Worksheet
Solvent Recycling By On-Site Distillation

Name of Solvent:	
A. Quantity of Recyclable Solvent Used	gallons/year
NOT RECYCLING COSTS	
B. New Solvent Purchase Costs	\$/gallon
C. Freight Charges for New Solvents	\$/gallon
D. Total Cost of Purchasing New Solvent D = B+C	\$/gallon
E. Solvent Disposal Cost	\$/gallon
F. Total Cost of Not Recycling F = D+E	\$/gallon
G. TOTAL COST of NOT RECYCLING G = F x A	\$/year
RECYCLING - OPERATION & MAINTENANCE COSTS (O & M)	
H. Still Operation - Labor in one year	\$/year
I. Still Maintenance - Labor in one year	\$/year
J. Power Costs in one year J = A x (\$/gallon)	\$/year
K. Water Costs in one year	\$/year
L. Total O & M costs for one year L = H+I+J+K	\$/year
SOLVENT RECONSTITUTION COSTS	
M. Cost of chemicals to reconstitute solvent after recycling (if needed, i.e. for recycling of formaldehyde)	\$/year
STILL BOTTOM COSTS	
N. Still Recovery Rate	%
O. Still Bottom Volume	

O = $A \times ((100 - N)/100)$	gallons/year
P. Cost of disposing of still bottoms $P = O \times E$	\$/year
Q. Cost of makeup solvent $Q = O \times D$	\$/year
R. TOTAL COST OF STILL BOTTOM $R = P + Q$	\$/year
S. TOTAL COST of RECYCLING $S = L + M + R$	\$/year
T. SAVINGS DIFFERENCE WITH RECYCLING T $= G - S$	\$/year
U. DISTILLATION UNIT COSTS	
V. Capital Cost of Still	\$
W. Still Installation - Materials	\$
X. Still Installation - Labor	\$
Y. Total Capital Cost of Still $Y = V + W + X$	\$
Z. PAYBACK PERIOD FOR RECYCLING $Z = Y/T$	years

Calculations:

A. Quantity of Recyclable Solvent Used = (gallons/day) x (number of working days/year). This number is not necessarily the total quantity of solvent your laboratory uses. Only the solvent that is recyclable (see Table 4 - Recyclable Solvents) should be used in the cost benefit analysis worksheet.

B and C. New Solvent Purchase Costs - refer to your own purchasing records or alternatively, ask your supplier about your purchasing costs.

E. The cost of disposing of your solvent wastes may be difficult to calculate accurately because some waste disposal companies charge flat rate fees for bulk shipments or have complex fee schedules. Be sure to consider all fees such as pickup fees, analytical lab fees, and maybe consulting fees (Dapson, p. 145).

H. Still Operation Labor in one year = (hours/week)x (rate/hr) x 52 weeks/yr. Consult with vendor on the amount of operation labor time required for their product.

I. Still Maintenance Labor in one year = (hours/week) x (rate/hr) x 52 weeks/yr.

J. Power Costs = Vendor should be able to provide the power costs per gallon for distillation.

K. Water Costs can be calculated by finding out how much water will be required to run the still. Refer to vendor for this information.

M. Reconstitution costs refers to any salts or chemicals that may need to be added to reconstitute the chemical composition of the solvent back to it's original form. An example of a solvent that may require reconstitution after distillation is formaldehyde. There are assay and salt kits to reconstitute recycled formaldehyde. Data used in this calculation will include the quantity of solvent used from line A of this table. For example, it may cost \$0.50/gallon of reconstitution salts and then multiply by gallons per year solvent used (see at) to yield \$/year.

N. Still recovery rate is the percentage by volume of product that can be recovered from the total product distilled. Different solvents and stills may have different recovery rates. Check with your vendor for this information.

P. Cost of disposing of still bottoms can be calculated by knowing the cost of disposal for solvent wastes (see Part E).

U. The breakdown of distillation costs should be obtained from your distillation unit vendor.